

(12) **United States Patent**
Kostrzewski

(10) **Patent No.:** **US 9,192,382 B2**
(45) **Date of Patent:** **Nov. 24, 2015**

(54) **SURGICAL INSTRUMENT WITH PIVOTABLE JAW MEMBER**

(71) Applicant: **Covidien LP**, Mansfield, MA (US)

(72) Inventor: **Stanislaw Kostrzewski**, Newton, CT (US)

(73) Assignee: **Covidien LP**, Mansfield, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 477 days.

(21) Appl. No.: **13/717,985**

(22) Filed: **Dec. 18, 2012**

(65) **Prior Publication Data**

US 2013/0105554 A1 May 2, 2013

Related U.S. Application Data

(63) Continuation of application No. 13/293,424, filed on Nov. 10, 2011, now Pat. No. 8,353,441, which is a continuation of application No. 12/249,182, filed on Oct. 10, 2008, now Pat. No. 8,070,038.

(51) **Int. Cl.**

A61B 17/068 (2006.01)

A61B 17/072 (2006.01)

A61B 18/14 (2006.01)

A61B 17/29 (2006.01)

(52) **U.S. Cl.**

CPC **A61B 17/0682** (2013.01); **A61B 17/072** (2013.01); **A61B 18/1445** (2013.01); **A61B 2017/07214** (2013.01); **A61B 2017/07235** (2013.01); **A61B 2017/07271** (2013.01); **A61B 2017/07278** (2013.01); **A61B 2017/2933** (2013.01); **A61B 2017/2943** (2013.01)

(58) **Field of Classification Search**

CPC **A61B 17/07207**; **A61B 19/068**

USPC **227/175.1**, **176.1**, **180.1**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,017,637 A	1/1962	Sampson
3,494,533 A	2/1970	Schuler
4,354,628 A	10/1982	Green
4,383,634 A	5/1983	Green
4,506,670 A	3/1985	Crossley
4,506,671 A	3/1985	Green
4,508,253 A	4/1985	Green
4,522,327 A	6/1985	Korthoff et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0 600 182 6/1994

OTHER PUBLICATIONS

European Search Report for EP 11 178 544 dated Sep. 29, 2011.

(Continued)

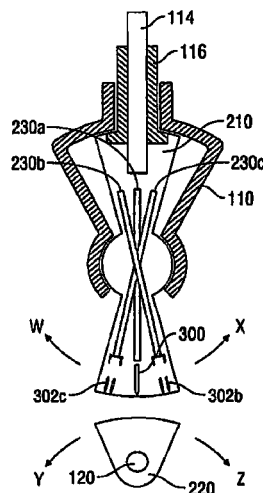
Primary Examiner — Michelle Lopez

(57)

ABSTRACT

A surgical instrument for surgically joining tissue is disclosed. The surgical instrument includes a handle assembly, an elongated portion extending distally from the handle assembly and defining a longitudinal axis, and an end effector disposed adjacent a distal portion of the elongated portion. The end effector includes a first jaw member and a second jaw member. The first jaw member defines a first axis, which is transverse to the longitudinal axis. The first jaw member is pivotable about the first axis. At least one of the first jaw member and the second jaw member is movable with respect to the other between a spaced-apart and an approximated position.

24 Claims, 5 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

4,530,453	A	7/1985	Green	5,542,594	A	8/1996	McKean et al.
4,566,620	A	1/1986	Green et al.	5,547,117	A	8/1996	Hamblin et al.
4,568,009	A	2/1986	Green	5,558,266	A	9/1996	Green et al.
4,573,622	A	3/1986	Green et al.	5,579,978	A	12/1996	Green et al.
4,580,712	A	4/1986	Green	5,603,443	A	2/1997	Clark et al.
4,632,290	A	12/1986	Green et al.	5,615,820	A	4/1997	Viola
4,665,916	A	5/1987	Green	5,706,997	A	1/1998	Green et al.
4,714,187	A	12/1987	Green	5,706,998	A	1/1998	Plyley et al.
4,715,520	A	12/1987	Roehr, Jr. et al.	5,732,871	A	3/1998	Clark et al.
4,728,020	A	3/1988	Green et al.	5,735,445	A	4/1998	Vidal et al.
4,767,044	A	8/1988	Green	5,752,644	A	5/1998	Bolanos et al.
4,802,614	A	2/1989	Green et al.	5,810,240	A	9/1998	Robertson
4,819,853	A	4/1989	Green	5,816,471	A	10/1998	Plyley et al.
4,848,367	A	7/1989	Avant et al.	5,833,695	A	11/1998	Yoon
4,869,414	A	9/1989	Green et al.	5,878,937	A	3/1999	Green et al.
4,881,544	A	11/1989	Green et al.	5,893,506	A	4/1999	Powell
4,881,545	A	11/1989	Isaacs et al.	5,894,979	A	4/1999	Powell
4,915,100	A	4/1990	Green	5,897,562	A	4/1999	Bolanos et al.
4,930,503	A	6/1990	Pruitt	5,964,394	A	10/1999	Robertson
4,941,623	A	7/1990	Pruitt	6,022,372	A	2/2000	Kontos
5,071,052	A	12/1991	Rodak et al.	6,045,560	A	4/2000	McKean et al.
5,100,042	A	3/1992	Gravener et al.	6,769,590	B2	8/2004	Vresh et al.
5,116,349	A	5/1992	Aranyi	6,817,508	B1	11/2004	Racenet et al.
5,190,203	A	3/1993	Rodak	6,953,139	B2	10/2005	Milliman et al.
5,312,023	A	5/1994	Green et al.	7,070,083	B2	7/2006	Jankowski
5,344,060	A	9/1994	Gravener et al.	7,237,708	B1	7/2007	Guy et al.
5,368,599	A	11/1994	Hirsch et al.	7,398,908	B2	7/2008	Holsten et al.
5,405,073	A	4/1995	Porter	8,016,176	B2	9/2011	Kasvikis et al.
5,413,267	A	5/1995	Solyntjes et al.	8,070,038	B2 *	12/2011	Kostrzewski 227/180.1
5,439,155	A	8/1995	Viola	8,172,122	B2	5/2012	Kasvikis et al.
5,452,836	A	9/1995	Huitema et al.	8,353,441	B2 *	1/2013	Kostrzewski 227/180.1
5,462,215	A	10/1995	Viola et al.	2003/0229344	A1	12/2003	Dycus et al.
5,464,144	A	11/1995	Guy et al.	2004/0164123	A1	8/2004	Racenet et al.
5,465,894	A	11/1995	Clark et al.	2007/0131732	A1	6/2007	Holsten et al.
5,470,006	A	11/1995	Rodak	2007/0233161	A1	10/2007	Weller et al.
5,470,008	A	11/1995	Rodak	2008/0041918	A1	2/2008	Holsten et al.
5,470,009	A	11/1995	Rodak	2008/0110958	A1	5/2008	McKenna et al.
5,497,935	A	3/1996	Gravier	2010/0072258	A1	3/2010	Farascioni et al.
5,503,320	A	4/1996	Webster et al.	2010/0213238	A1	8/2010	Farascioni et al.
5,509,596	A	4/1996	Green et al.				

OTHER PUBLICATIONS

European Search Report for EP 11 250 468.3 dated Aug. 10, 2011.

* cited by examiner

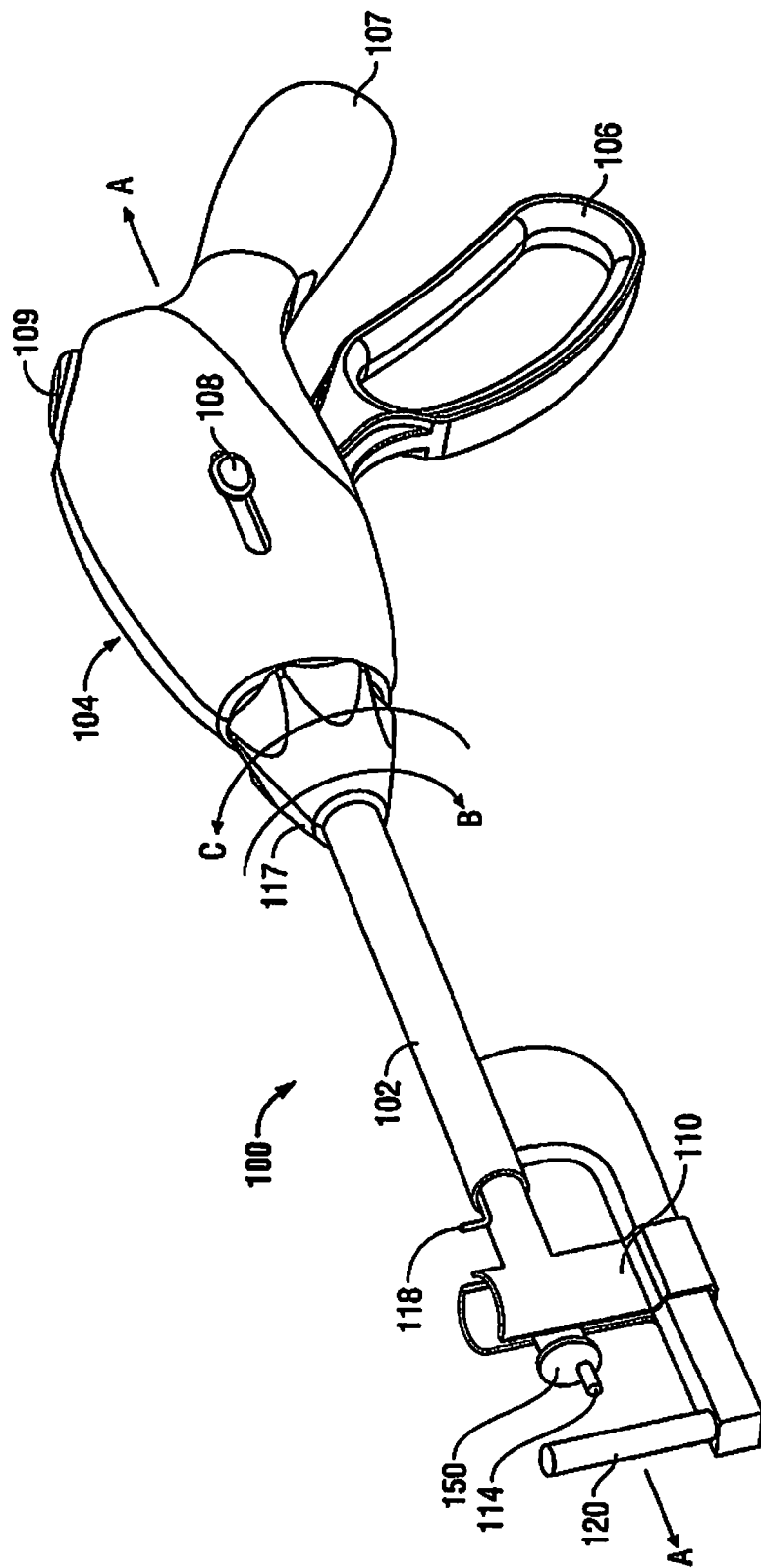


FIG. 1

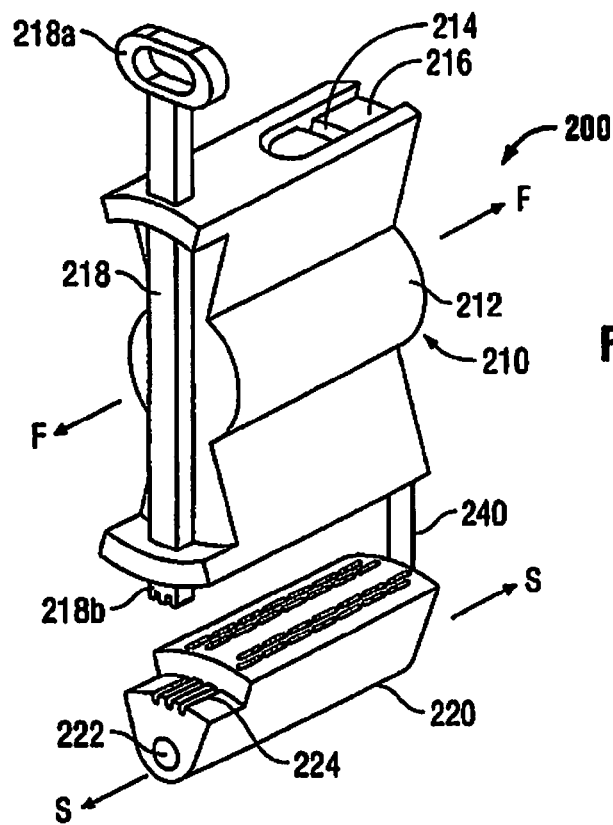
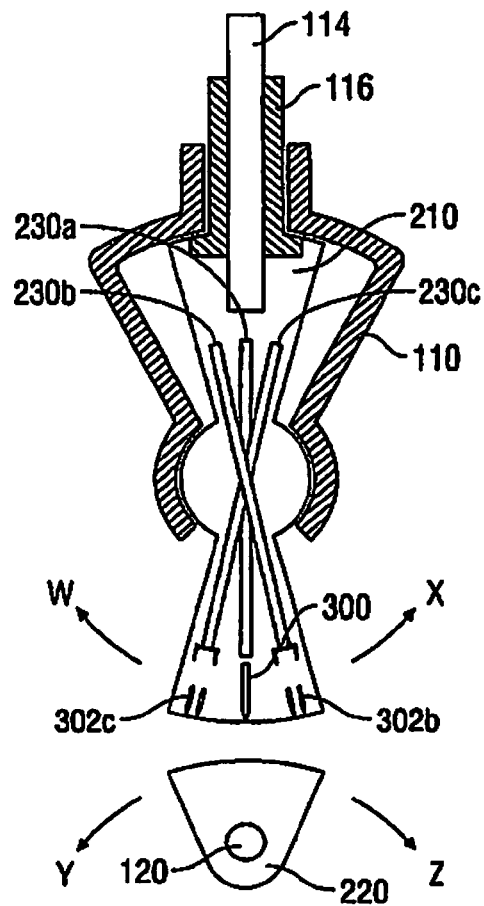


FIG. 3



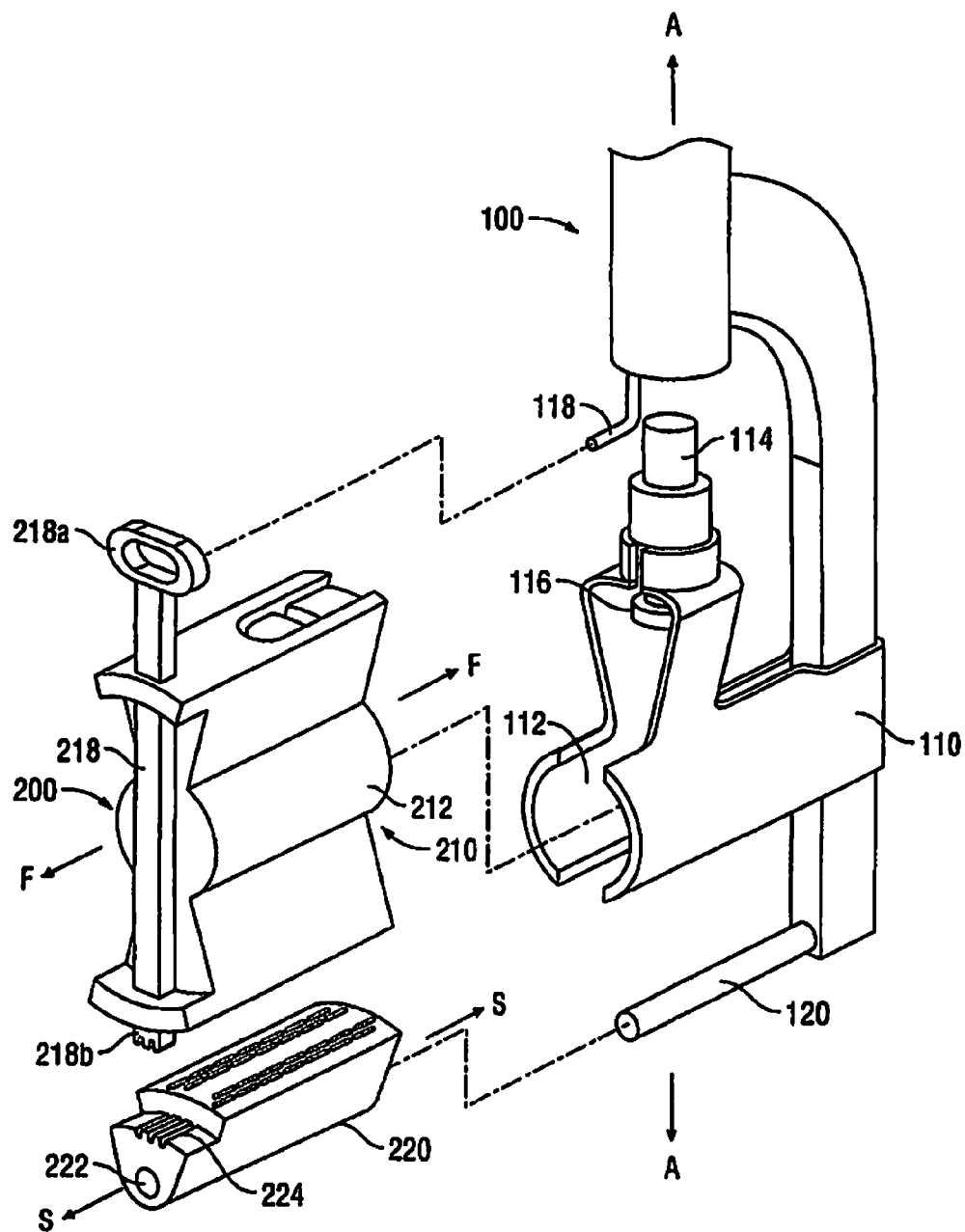


FIG. 4

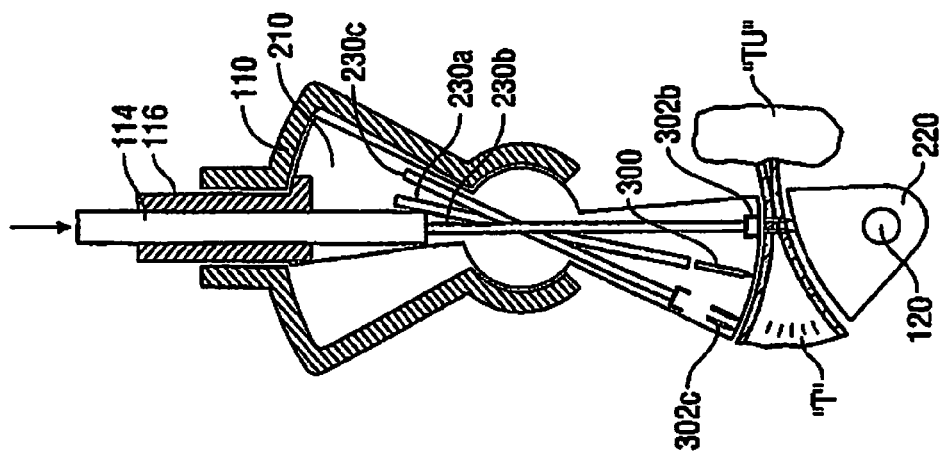


FIG. 5C

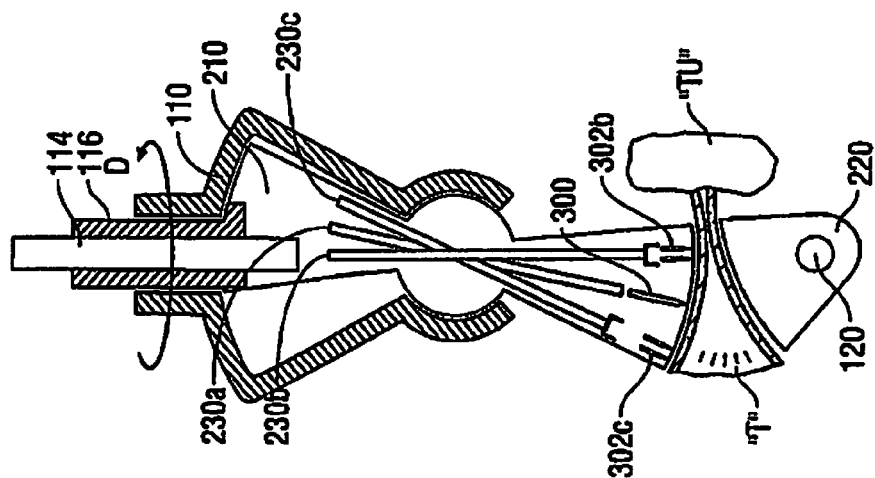


FIG. 5B

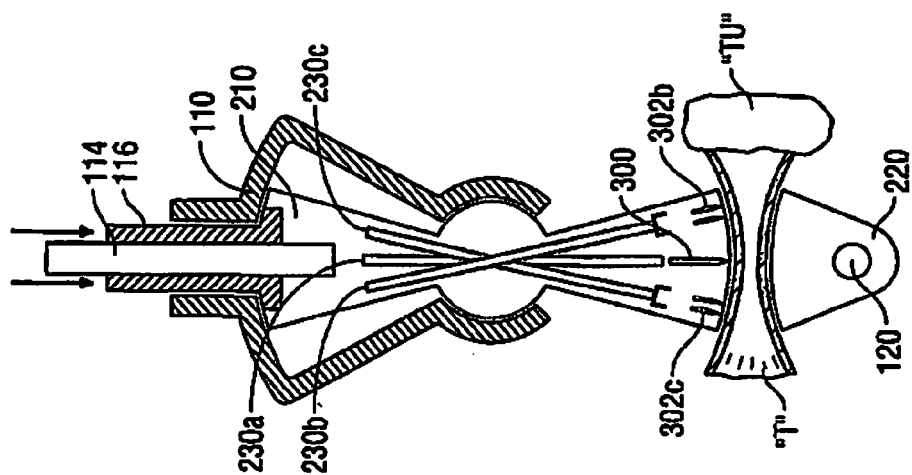


FIG. 5A

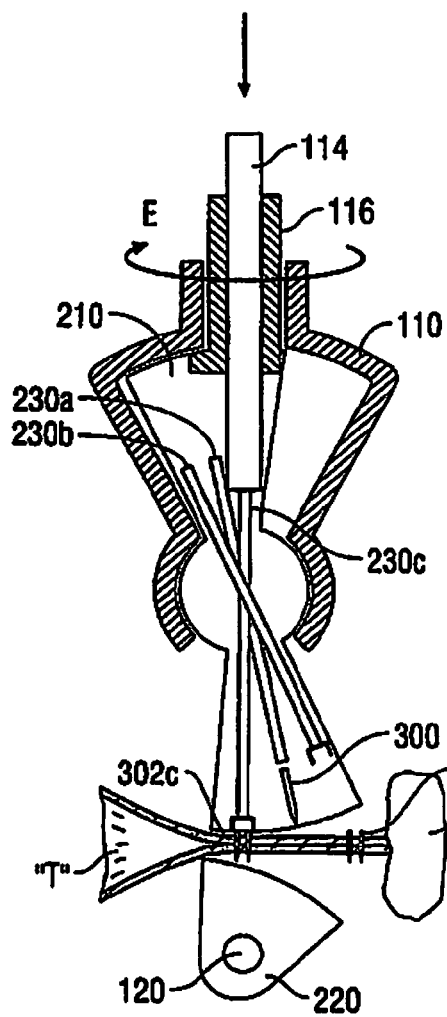


FIG. 5D

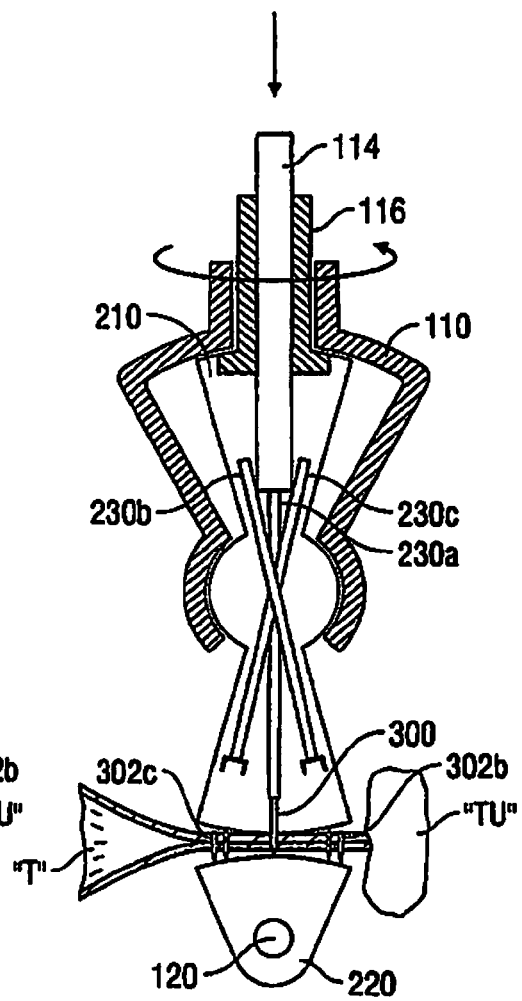


FIG. 5E

SURGICAL INSTRUMENT WITH PIVOTABLE JAW MEMBER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/293,424, filed on Nov. 10, 2011, now U.S. Pat. No. 8,353,441, which is a continuation of U.S. patent application Ser. No. 12/249,182, filed Oct. 10, 2008, now U.S. Pat. No. 8,070,038, the entire contents of each of which are hereby incorporated by reference herein.

BACKGROUND

1. Technical Field

The present disclosure relates generally to instruments for surgically joining tissue. More specifically, the present disclosure relates to a surgical instrument having a pivotable jaw member.

2. Background of Related Art

Various types of surgical instruments used to surgically join tissue are known in the art, and are commonly used, for example, for closure of tissue or organs in transection, resection, anastomoses, for occlusion of organs in thoracic and abdominal procedures, and for electrosurgically fusing or sealing tissue.

One example of such a surgical instrument is a surgical stapling instrument, which may include an anvil assembly, a cartridge assembly for supporting an array of surgical staples, an approximation mechanism for approximating the cartridge and anvil assemblies, and a firing mechanism for ejecting the surgical staples from the cartridge assembly.

Using a surgical stapling instrument, it is common for a surgeon to approximate the anvil and cartridge members. Next, the surgeon can fire the instrument to emplace staples (e.g., a row of staples) in tissue. Additionally, the surgeon may use the same instrument or a separate instrument to emplace more staples (e.g., another row) and/or to cut the tissue adjacent or between the row(s) of staples.

Other examples of a surgical instrument of the present disclosure include electrosurgical (e.g., monopolar and bipolar) forceps. Electrosurgical forceps utilize both mechanical clamping action and electrical energy to affect hemostasis by heating the tissue and blood vessels to coagulate, cauterize and/or seal tissue.

SUMMARY

The present disclosure relates to a surgical instrument for surgically joining tissue. The surgical instrument includes a handle assembly, an elongated portion and an end effector. The elongated portion extends distally from the handle assembly and defines a longitudinal axis. The end effector is disposed adjacent a distal portion of the elongated portion and includes a first jaw member (e.g., cartridge assembly) and a second jaw member (e.g., anvil assembly). The first jaw member defines a first axis extending along the first jaw member, which is transverse to the longitudinal axis of the elongated portion. The first jaw member is pivotable about the first axis. At least one of the first jaw member and the second jaw member is movable with respect to the other between a spaced-apart position and an approximated position.

In a disclosed embodiment, the second jaw member defines a second axis extending along the second jaw member, which is parallel to the first axis; the second jaw member is pivotable about the second axis. Here, the second jaw member may be

configured to pivot about the second axis in response to pivoting of the first jaw member about the first axis. In a further embodiment, the second jaw member is configured to pivot in an opposite direction as the first jaw member.

In an embodiment of the present disclosure, the cartridge assembly includes two rows of staples therein and each row of staples is individually actuatable. In this embodiment, the cartridge assembly may include a knife disposed at least partially therein and that each of the knife and the two rows of staples is individually actuatable. Here, the cartridge assembly may include three angularly offset pushers disposed therein; each of the pushers is independently movable with respect to each other.

In a disclosed embodiment, the surgical instrument includes a firing rod disposed in mechanical cooperation with the handle assembly. The firing rod is configured to individually engage at least two angularly offset pushers disposed at least partially within the first jaw member.

The present disclosure also relates to a method of surgically joining tissue. The method includes the step of providing a surgical stapling instrument including a handle assembly, an elongated portion and an end effector. The elongated portion extends distally from the handle assembly and defines a longitudinal axis. The end effector is disposed adjacent a distal portion of the elongated portion and includes a first jaw member, which defines a first axis, and a second jaw member, which defines a second axis. The method also includes the steps of positioning the end effector adjacent tissue, moving at least one of the first jaw member and the second jaw member towards the other from a spaced-apart position to an approximated position to engage tissue therebetween, pivoting the first jaw member about the first axis, and pivoting the second jaw member about the second axis.

In a disclosed embodiment, the method includes the step of firing a first row of staples from the first jaw member towards the second jaw member. Here, an additional step may include firing a second row of staples from the first jaw member towards the second jaw member, where the second row of staples is fired independently of the first row of staples. The step of pivoting the first jaw member and the second jaw member may be between the step of firing the first row of staples and the step of firing the second row of staples.

In an embodiment of the disclosed method, the longitudinal axis is transverse to the first axis. In a disclosed method, the first axis is parallel to the second axis.

The present disclosure also relates to a loading unit configured for releasable engagement with a surgical instrument. The loading unit includes a cartridge assembly configured for releasable engagement with a cartridge housing of the surgical instrument, and an anvil assembly configured for releasable engagement with an anvil housing of the surgical instrument. The cartridge assembly is pivotable with respect to the cartridge housing when the cartridge assembly is engaged with the cartridge housing.

In a disclosed embodiment of the loading unit, the anvil assembly is pivotable with respect to the anvil housing when the anvil assembly is engaged with the anvil housing. Here, the cartridge assembly and the anvil assembly may be independently pivotable of each other.

In an embodiment of the present disclosure, the cartridge assembly and the anvil assembly are releasably secured to each other via a breakable connector. In another embodiment, the anvil assembly includes a bore disposed at least partially therethrough and the bore is configured to mechanically engage a post of the surgical instrument.

In a further aspect of the present disclosure, a surgical instrument for surgically joining tissue comprises a handle

3

assembly; an elongated portion extending distally from the handle assembly and defining a longitudinal axis; and an end effector disposed adjacent a distal portion of the elongated portion. The end effector includes a first jaw member defining a first axis extending along the first jaw member, the first axis extending generally in the same direction as the longitudinal axis of the elongated portion, the first jaw member being pivotable about the first axis. A second jaw member is included. At least one of the first jaw member and the second jaw member is movable with respect to the other between a spaced-part position and an approximated position.

The second jaw member may define a second axis extending along the second jaw member, the second axis being parallel to the first axis. The second jaw member is pivotable about the second axis.

The second jaw member is configured to pivot about the second axis in response to pivoting of the first jaw member about the first axis, in certain embodiments. The second jaw member can be configured to pivot in an opposite direction as the first jaw member.

The first jaw member may include a cartridge assembly and the second jaw member may include an anvil assembly. In certain embodiments, the cartridge assembly includes two rows of staples therein and each row of staples can be individually actuatable. The cartridge assembly can include a knife disposed at least partially therein and each of the knife and the two rows of staples can be individually actuatable.

The cartridge assembly, in certain embodiments, includes three angularly offset pushers disposed therein and wherein each of the three pushers is independently moveable with respect to each other. The surgical instrument desirably includes a firing rod disposed in mechanical cooperation with the handle assembly, the firing rod being configured to individually engage at least two angularly offset pushers disposed at least partially within the first jaw member.

In another aspect of the present disclosure, a surgical instrument for surgically joining tissue comprises a handle assembly; an elongated portion extending distally from the handle assembly and defining a longitudinal axis; and an end effector disposed adjacent a distal portion of the elongated portion. The end effector includes a first jaw member defining a first axis extending along the first jaw member, the first jaw member being pivotable about the first axis and including a cartridge assembly, the cartridge assembly having a first row of surgical fasteners of a first type and a second row of surgical fasteners of a second type; and a second jaw member including an anvil assembly. At least one of the first jaw member and the second jaw member is movable with respect to the other between a spaced-apart position and an approximated position.

The second jaw member may define a second axis extending along the second jaw member, the second axis being parallel to the first axis, and the second jaw member may be pivotable about the second axis.

The first type can be selected from the group consisting of a material, a size, staples, and two-part fasteners. The second type is selected from the group consisting of: a metal material, a polymeric material, a staple leg length, and two-part fasteners. The first type is different from the second type.

In certain embodiments, the cartridge assembly includes two rows of staples therein and each row of staples can be individually actuatable. The cartridge assembly can include a knife disposed at least partially therein and each of the knife and the two rows of staples can be individually actuatable.

BRIEF DESCRIPTION OF FIGURES

Various embodiments of the presently disclosed surgical instrument are disclosed herein with reference to the drawings, wherein:

4

FIG. 1 is a perspective view of a surgical instrument in accordance with the present disclosure where the surgical instrument is shown without a loading unit;

FIG. 2 is a perspective view of a loading unit for use with the surgical instrument of FIG. 1;

FIG. 3 is a transverse cross-sectional view of the loading unit of FIG. 2;

FIG. 4 is an assembly view of the loading unit of FIGS. 2 and 3 and a portion of the surgical instrument of FIG. 1; and

FIGS. 5A-5E are transverse cross-sectional views of the loading unit of FIGS. 2-4 interacting with a portion of the surgical instrument of FIG. 1, shown at various stages of operation.

DETAILED DESCRIPTION

Embodiments of the presently disclosed surgical instrument and loading unit for use therewith, are described in detail with reference to the drawings, wherein like reference numerals designate corresponding elements in each of the several views.

A surgical instrument of the present disclosure is indicated as reference numeral **100** in FIG. 1. A loading unit (or "DLU") **200** for use with surgical instrument **100** is shown in FIGS. 2-5E. While a specific type of a surgical stapling instrument is illustrated in FIG. 1, the present disclosure also relates to other types of surgical stapling instruments and to electro-surgical forceps, and to loading units for use therewith. DLU **200** is attachable to an elongated portion **102** (which defines a longitudinal axis "A-A," as shown in FIGS. 1 and 4) of surgical instrument **100**, e.g., to allow surgical instrument **100** to have greater versatility. Elongated portion **102** distally extends from handle assembly **104**, which includes movable handle **106** and stationary handle **107**. DLU **200** may be configured for a single use, and/or may be configured to be used more than once.

Examples of loading units for use with a surgical stapling instrument are disclosed in commonly-owned U.S. Pat. No. 5,752,644 to Bolanos et al, the entire contents of which are hereby incorporated by reference herein. Further details of an endoscopic surgical stapling instrument are described in detail in commonly-owned U.S. Pat. No. 8,953,139 to Milliman et al, the entire contents of which are hereby incorporated by reference herein. Further details of electrosurgical forceps are described in commonly-owned patent application Ser. No. 10/369,894, filed on Feb. 20, 2003, entitled VESSEL SEALER AND DIVIDER AND METHOD OF MANUFACTURING THE SAME, the entire contents of which are hereby incorporated by reference herein.

Referring now to FIGS. 2-5E, DLU **200** of the present disclosure is shown. DLU **200** includes a first jaw member or cartridge assembly **210** and a second jaw member or anvil assembly **220**. In the illustrated embodiments, first jaw member **210** and second jaw member **220** are temporarily connected to one another by a breakable connector **240** (FIG. 2). First jaw member **210** defines a first axis "F-F" (shown in FIGS. 2 and 4) and is configured for releasable engagement with a cartridge housing **110** of surgical instrument **100**. Second jaw member **220** defines a second axis "S-S" (shown in FIGS. 2 and 4) and is configured for releasable engagement with an anvil housing **120** of surgical instrument. In the illustrated embodiments, first axis "F-F" and second axis "S-S" are parallel to one another and are each disposed transverse to the longitudinal axis "A-A," but further embodiments include jaw members that are angled with respect to one another and/or to the longitudinal axis. While not explicitly illustrated in the accompanying figures, it is also envisioned that first jaw

5

member **210** and second jaw member **220** are fixed to (i.e., not removable from) surgical instrument **100**.

The illustrated embodiments show cartridge assembly **210** having a circular outer portion **212** which is configured to engage a circular inner portion **112** of cartridge housing **110**. With particular reference to FIGS. 5A-5E, the interaction between circular outer portion **212** and circular inner portion **112** helps enable a pivot-type movement between first jaw member **210** and cartridge housing **110**. That is, first jaw member **210** is able to pivot (e.g., swivel, rotate, etc.) about axis “F-F” with respect to cartridge housing **110** in the general direction of arrows “W” and “X” in FIG. 3. It is envisioned that cartridge assembly **210** and/or cartridge housing **110** includes other features that help enable the pivot-type movement therebetween. For example, cartridge housing **110** may include a post (not shown) that extends through a bore (not shown) of cartridge assembly **210**, or vice versa.

It is envisioned that surgical instrument **100** includes a selector member **116** (e.g., a cam member) disposed in mechanical cooperation with a selector dial **117** (FIG. 1). It is envisioned that rotation of selector dial **117** in the general direction of arrow “B” (FIG. 1) causes selector member **116** to rotate in the general direction of arrow “D” (FIG. 5B). Correspondingly, it is envisioned that rotation of selector dial **117** in the general direction of arrow “C” (FIG. 1) causes selector member **116** to rotate in the general direction of arrow “C” (FIG. 5D). That is, the combination of selector member **116** and selector dial **117** help enable a user to pivot cartridge assembly **210** within cartridge housing **110**.

Referring again to FIGS. 2-5E, anvil assembly **220** includes a bore **222** (see FIGS. 2 and 4) extending therethrough. Bore **222** of anvil assembly **220** is configured to mechanically engage anvil housing **120**, which is illustrated as a post-like structure. As can be appreciated, the interaction between bore **222** and anvil housing **120** helps enable a pivot-type movement between anvil assembly **220** and anvil housing **120**. That is, second jaw member **220** is able to pivot (e.g., swivel, rotate, etc.) about axis “S-S” with respect to anvil housing **120** in the general direction of arrows “Y” and “Z” in FIG. 3. It is envisioned that anvil assembly **220** and/or anvil housing **120** includes other features that help enable the pivot-type movement therebetween. For example, anvil housing **110** may include a circular inner portion (not shown) that mechanically engages a circular outer portion (not shown) of anvil assembly **220**, or vice versa.

With particular reference to FIGS. 2 and 4, cartridge assembly **210** includes a first access portion **214** and a second access portion **216**. First access portion **214** is configured to accept translation of a firing rod **114** therethrough. Second access portion **216** is configured to allow at least a portion of selector member **116** to pass therethrough. It is envisioned that firing rod **114** is translatable through a portion of selector member **116**.

In the embodiments illustrated in FIGS. 2 and 4, cartridge assembly **210** also includes a tissue stop member **218**. A proximal portion **218a** of tissue stop member **218** is configured to engage a rod **118** of surgical instrument **100**. Tissue stop member **218** is movable (via rod **118**) with respect to the other parts of cartridge assembly **210** between a first position where a distal portion **218b** of tissue stop member **218** is spaced from anvil assembly **220** and a second position where distal portion **218b** of tissue stop member **218** engages a portion **224** of anvil assembly **220**. More particularly, distal portion **218b** of tissue stop member **218** is configured as a portion of a gear and is engagable with portion **224** of anvil assembly **220**, which is configured as a corresponding portion of a gear. Specifically, as cartridge assembly **210** and anvil

6

assembly **220** pivot (e.g., in the directions of arrow “W” and arrow “Y,” respectively), the portions of the gear rotate therewith. Additionally, portions of the gear may help temporarily maintain the alignment of cartridge assembly **210** and anvil assembly **220** with respect to each other in response to firing staples from cartridge assembly **210**, for instance.

Referring now to FIGS. 3 and 5-5E, the internal components of cartridge assembly **210** are shown. In the illustrated embodiments, cartridge assembly **210** includes three pushers **230a**, **230b** and **230c** (collectively referred to as “pushers **230**”) therein. It is envisioned that pushers **230** are comb-type pushers that intersect each other. Each pusher **230** is selectively engagable by firing rod **114**. The particular pusher **230a**, **230b** or **230c** that is engaged by firing rod **114** is dependent on the orientation of cartridge assembly **210** within cartridge housing **110**. That is, when cartridge assembly **210** is in a first position (FIGS. 5A and 5E), firing rod **114** is substantially aligned with pusher **230a**; when cartridge assembly **210** is in a second position (FIGS. 5B and 5C), firing rod **114** is substantially aligned with pusher **230b**; and when cartridge assembly **210** is in a third position (FIG. 5D), firing rod **114** is substantially aligned with pusher **230c**.

Pusher **230a** is configured to mechanically engage a knife **300** disposed within cartridge assembly **210**, such that actuation of firing rod **114** (in its first position) causes knife **300** to move from a first position (FIG. 5A) where knife **300** is at least partially disposed within cartridge assembly **210** to a second position (FIG. 5E) where at least a portion of knife **300** extends from cartridge assembly **210** to cut tissue. In further embodiments of the present disclosure, the knife is omitted.

Pushers **230b** and **230c** are each configured to mechanically engage a respective row of fasteners **302b** and **302c**, which are disposed within cartridge assembly **210**. Actuation of firing rod **114** (in its second position) causes pusher **230b** to move from a first position (FIG. 5B) where pusher **230b** does not engage fasteners **302b**, to a second position (FIG. 5C) where pusher **230b** engages fasteners **302b** to eject fasteners **302b** from cartridge assembly **210** towards anvil assembly **220**. Actuation of firing rod **114** (in its third position) causes pusher **230c** to move from a first position (not explicitly shown) where pusher **230c** does not engage fasteners **302c**, to a second position (FIG. 5D) where pusher **230c** engages fasteners **302c** to eject fasteners **302c** from cartridge assembly **210** towards anvil assembly **220**.

In use, surgical instrument **100** may include DLU **200** mechanically engaged therewith or DLU **200** may be separated therefrom. In the embodiments where DLU **200** is not initially engaged with surgical instrument **100**, a user can load cartridge assembly **210** and anvil assembly **220** of DLU **200** into mechanical engagement with surgical instrument **100**. Next, a user positions surgical instrument **100** such that target tissue “T” (e.g., tissue to be stapled and cut) is located between jaw members **210**, **220**. The user may then translate a tissue stop knob **108**, which causes distal translation of rod **118** (e.g., in electrical or mechanical cooperation with tissue stop knob **108**), which in turn causes tissue stop member **218** to distally translate thus causing distal portion **218b** of tissue stop member **218** to engage portion **224** of anvil assembly **220**.

To clamp the jaw members **210**, **220** with respect to each other (e.g., moving cartridge assembly **210** towards anvil assembly **220**), a user at least partially actuates (e.g., fully actuates) movable handle **106** (i.e. moves movable handle **106** towards stationary handle **107**). If repositioning of cartridge assembly **210**/anvil assembly **220** is desired, a user can actuate a clamp release button **109** to separate cartridge assembly **210** and anvil assembly **220** from each other. It is

7

envisioned that movable handle **106** and firing rod **114** both return to their respective original position after a partial or full stroke of movable handle **106**. Thereafter, a user can break connector **240**, which temporarily connects/aligns cartridge assembly **210** and anvil assembly **220**.

Once jaw members **210**, **220** are in their desired location about tissue “T” (FIG. 5A), the user can position selector member **150** via selector knob **117** to align pusher **230b** with firing rod **114** (FIG. 5B). Next, if desired, the user can use conventional methods to flush the area adjacent a tumor “TU” to help rid the area of tumor cells. To eject fasteners **302b** from cartridge assembly **210** through tissue “T” and towards anvil assembly **220**, the user at least partially actuates movable handle **106** which causes distal translation of firing rod **114** into pusher **230b**, which forces pusher **230b** into engagement with fasteners **302b** (FIG. 5C).

Next, with reference to FIG. 5D, the user can position selector member **150** via selector knob **117** to align pusher **230c** with firing rod **114**. To eject fasteners **302c** from cartridge assembly **210**, the user at least partially actuates movable handle **108** which causes distal translation of firing rod **114** into pusher **230c**, which forces pusher **230c** into engagement with fasteners **302c**.

After both rows of fasteners **302b**, **302c** have been fired from cartridge assembly **210**, the user can use selector knob **117** to position selector member **150** such that knife **300** is aligned with firing rod **114**. To cut tissue, the user at least partially actuates movable handle **106** which causes distal translation of firing rod **114** into pusher **230a**, which forces pusher **230a** into engagement with knife **300**. Alternatively, the user can use a separate instrument to cut tissue “T”.

Next, the user can press clamp release button **109** to separate cartridge assembly **210** and anvil assembly **220** from each other, and thus to unclamp tissue “T.” Finally, tissue stop knob **108** can be proximally translated to disengage tissue stop member **218** from anvil assembly **220**. As can be appreciated, the disclosed method results in the sealing (and separation) of both ends of tissue (e.g., an organ).

It is envisioned that the performing of the various functions of the present disclosure can be accomplished by various suitable methods and are not intended to be limited by the above description. For example, at least one of clamping tissue “T,” pivoting cartridge assembly **210**, actuating firing rod **114** and cutting tissue “T” can be accomplished via a separate handle or other actuating device (not shown). Additional handles and/or other types of handles can also be used, such as, for example, motor-driven, hydraulic, ratcheting, etc.

It is envisioned that the use of surgical instrument **100** and/or DLU **200** of the present disclosure may help facilitate access to lower pelvis regions, e.g., during lower anterior resection (“LAR”).

In further embodiments of the present disclosure, the cartridge assembly houses a first row of surgical fasteners of a first type, and a second row of surgical fasteners of a second type. The user of the surgical instrument may choose to deploy either row of surgical fasteners, or both rows of surgical fasteners, according to the user’s judgment. Fastener types include staples of various materials such as surgical steel, other metals, polymers and/or absorbable or resorbable materials, two-part fasteners of various materials, or fasteners of various sizes. For example, the first row of fasteners can comprise staples having leg lengths of a first size, and the second row of fasteners can comprise staples having leg lengths of a second size.

The selector member **150** may be directly actuated by hand or a button or other handle member can be provided on the handle assembly **104** for moving the selector member **150**

8

remotely. The button can be connected to selector member **150** by linkages, cams, gears, or other known mechanisms.

While the above description contains many specifics, these specifics should not be construed as limitations on the scope of the present disclosure, but merely as illustrations of various embodiments thereof. Therefore, the above description should not be construed as limiting, but merely as exemplifications of various embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the disclosure.

What is claimed is:

1. A loading unit configured for releasable engagement with a surgical instrument, comprising:

a first jaw member pivotable about a first axis, the first jaw member including a pair of pushers, each pusher of the pair of pushers configured to engage and eject a staple from the first jaw member, the pushers defining an acute angle therebetween, the first jaw member pivotable between a first position in which a firing rod of the surgical instrument is aligned with a first pusher of the pair of pushers and a second position in which the firing rod is aligned with a second pusher of the pair of pushers; and

a second jaw member defining a second axis, at least one of the first or second jaw members being movable relative to each other between open and approximated positions to clamp tissue between the first and second jaw members, wherein the first and second axes are substantially parallel to each other.

2. The loading unit according to claim 1, wherein the first jaw member further includes a third pusher disposed between the first and second pushers.

3. The loading unit according to claim 1, wherein the second jaw member is pivotable about the second axis.

4. The loading unit according to claim 3, wherein the second jaw member is configured to pivot about the second axis in response to pivoting of the first jaw member about the first axis.

5. The loading unit according to claim 3, wherein the first and second jaw members are configured to pivot in opposite directions.

6. The loading unit according to claim 3, wherein the first and second jaw members are configured to pivot independent of each other.

7. The loading unit according to claim 1, wherein the first and second jaw members are releasably secured to each other by a breakable connector.

8. The loading unit according to claim 1, wherein the second jaw member includes an anvil assembly.

9. The loading unit according to claim 1, wherein the second jaw member defines a bore disposed at least partially therethrough, the bore configured to mechanically engage a post of the surgical instrument.

10. The loading unit according to claim 1, wherein the first jaw member further includes a tissue stop member configured to engage the tissue disposed between the first and second jaw members.

11. The loading unit according to claim 10, wherein the tissue stop member is configured to move in a direction transverse to the first axis.

12. A loading unit configured for releasable engagement with a surgical instrument, comprising:

a first jaw member pivotable about a first axis, the first jaw member including a pair of pushers, each pusher of the pair of pushers configured to engage and eject a staple from the first jaw member, the first jaw member pivotable between a first position in which a firing rod of the

9

surgical instrument is aligned with a first pusher of the pair of pushers and a second position in which the firing rod is aligned with a second pusher of the pair of pushers; and

a second jaw member defining a second axis, at least one of the first or second jaw members being movable relative to each other between open and approximated positions to clamp tissue between the first and second jaw members, wherein the first and second axes are substantially parallel to each other, wherein the first and second jaw members are releasably secured to each other by a breakable connector.

13. The loading unit according to claim 12, wherein the pushers define an acute angle therebetween.

14. The loading unit according to claim 12, wherein the first jaw member further includes a third pusher disposed between the first and second pushers.

15. The loading unit according to claim 12, wherein the second jaw member is pivotable about the second axis.

16. The loading unit according to claim 15, wherein the second jaw member is configured to pivot about the second axis in response to pivoting of the first jaw member about the first axis.

17. The loading unit according to claim 12, wherein the first and second jaw members are configured to pivot in opposite directions.

18. The loading unit according to claim 12, wherein the first and second jaw members are configured to pivot independent of each other.

19. The loading unit according to claim 12, wherein the second jaw member defines a bore disposed at least partially therethrough, the bore configured to mechanically engage a post of the surgical instrument.

10

20. A loading unit configured for releasable engagement with a surgical instrument, comprising:

a first jaw member pivotable about a first axis, the first jaw member including a tissue stop member and a pair of pushers, each pusher of the pair of pushers configured to engage and eject a staple from the first jaw member, the first jaw member pivotable between a first position in which a firing rod of the surgical instrument is aligned with a first pusher of the pair of pushers and a second position in which the firing rod is aligned with a second pusher of the pair of pushers; and

a second jaw member defining a second axis, at least one of the first or second jaw members being movable relative to each other between open and approximated positions to clamp tissue between the first and second jaw members, wherein the first and second axes are substantially parallel to each other, wherein the tissue stop member of the first jaw member is configured to engage the tissue disposed between the first and second jaw members.

21. The loading unit according to claim 20, wherein the tissue stop member is configured to move in a direction transverse to the first axis.

22. The loading unit according to claim 20, wherein the first jaw member further includes a third pusher disposed between the first and second pushers.

23. The loading unit according to claim 20, wherein the second jaw member is configured to pivot about the second axis in response to pivoting of the first jaw member about the first axis.

24. The loading unit according to claim 20, wherein the second jaw member defines a bore disposed at least partially therethrough, the bore configured to mechanically engage a post of the surgical instrument.

* * * * *